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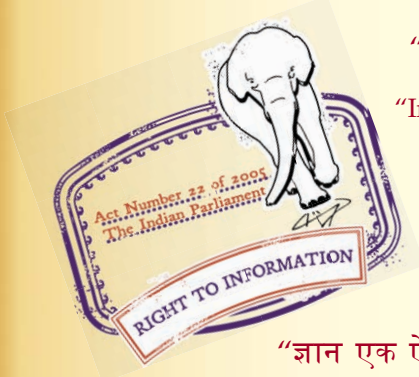
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“Step Out From the Old to the New”

IS 6087 (1971): Metal Cutting Shears [PGD 6: Earth, Metal And Wood Working Hand Tools]



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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard
SPECIFICATION FOR
METAL CUTTING SHEARS
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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BHADUR SHAH ZAFAR MARG

Indian Standard

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Indian Standard

SPECIFICATION FOR METAL CUTTING SHEARS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 21 April 1971, after the draft finalized by the Hand Tools Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard has been formulated with a view to ensure the minimum standard of quality of the tools so that they will have a longer useful life. It specifies certain basic overall dimensions of functional importance only without imposing any limitation on details of design.

0.3 In the preparation of this standard, assistance has been derived from the following documents:

CSN 226113 : 59 Rovne nuzky na plech (Straight hand shears).
Urad pro normalizaci a mereni (Czechoslovakia).

CSN 226116 : 59 Vystrihovaci nuzky na plech (Curved hand shears).
Urad pro normalizaci a mereni (Czechoslovakia).

DIN 6438 : 1946 Handblechscherer (tinmen's shears). Deutscher
Normenausschuss (Federal Republic of Germany).

Drawing No. IND/GS/625 Shears, tinman's, snip. Ministry of Defence,
Government of India.

Drawing No. IND/GS/861 Shears, tinman's, snip, bent. Ministry of
Defence, Government of India.

GGG-S-291e : 1964 Shears, metal cutting; bench and hand. Federal
Defence, Supply Service, USA.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements for straight cut and circular cut hand metal cutting shears for general purposes.

*Rules for rounding off numerical values (revised).

IS : 6087 - 1971

2. MATERIAL

2.1 Shears shall be manufactured from a suitable high carbon steel or tool steel meeting with the requirements laid down in **3** and **10**. Some of the suitable steels for this purpose are C80 of Schedule II and T80Mn65 of Schedule VI of IS : 1570-1961* with a maximum sulphur and phosphorus content of 0.05 percent each.

3. HARDNESS

3.1 The hardness of the blades shall be within the range of 545 to 655 *HV* (see IS : 1501-1968†) or 52 to 58 *HRC* (see IS : 1586-1968‡).

4. DIMENSIONS

4.1 The main dimensions for the metal cutting shears shall be as given in Tables 1 to 5.

5. MANUFACTURE

5.1 Shears shall consist essentially of two cutting blades, two handles and a bolt.

5.2 Blades shall be of either one-piece or two-piece construction at the option of the supplier. One-piece blades shall be forged in a single piece integral with the handle. Blades of two pieces shall be joined to handles by forge welding into a single integral unit. In case of two-piece blade construction, the cutting edges shall be at least 2 mm in depth for the grindings which may be required during the life of the tool.

5.3 Blade cutting edge shall be suitably beveled and properly hardened and tempered. Cutting edges shall be slightly crowned so that the proper cutting angle shall be maintained throughout the full length of cut.

5.4 Blade bearing and mating surfaces shall be ground true, shall be smooth and of ample width to prevent the blades from twisting or springing open under ordinary cutting loads likely to be encountered in service.

5.5 The centre bolt and nut shall serve as a pivot joint holding the blades together and shall provide a means for blade adjustment. The centre bolt shall be prevented from rotating in one blade and permitted to rotate in the other. The tensioning nut shall be of a self-locking type.

*Schedules for wrought steels for general engineering purposes.

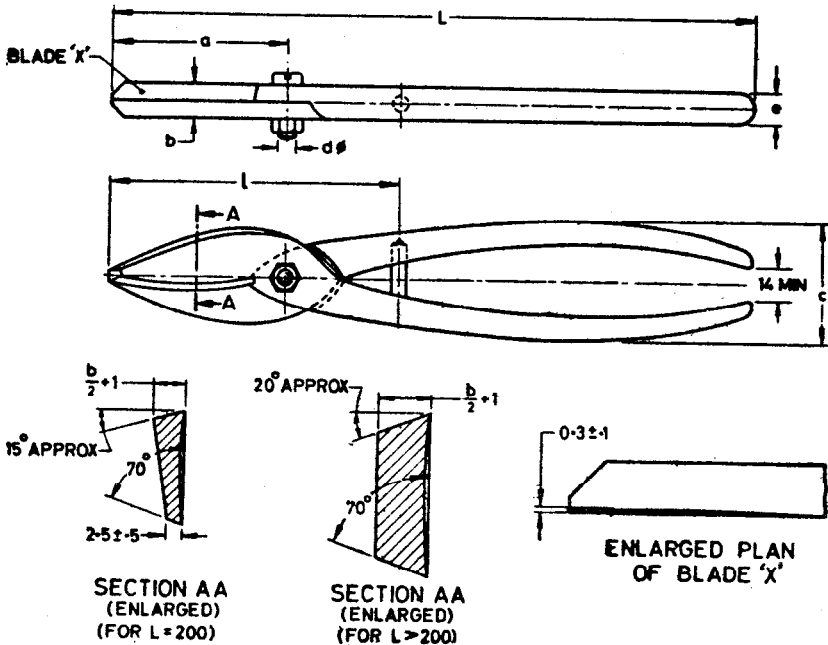
†Method for Vickers hardness test for steel (*first revision*).

‡Methods for Rockwell hardness test (B and C scales) for steel (*first revision*).

TABLE 1 DIMENSIONS FOR METAL CUTTING SHEARS, TYPE A

(Clause 4.1)

All dimensions in millimetres.



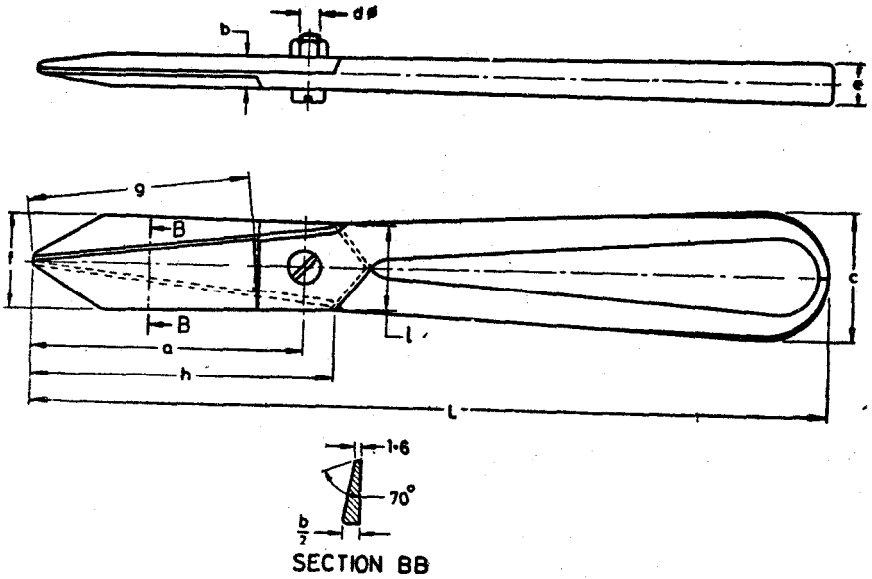
NOMINAL SIZE	L ± 5	a ± 2	b ± 2	c ± 5	d	e Min	l Max
200	200	65	10	45	M6	8	105
250	250	70	14	50	M6	12	125
300	300	82	16	56	M8	14	135
350	350	114	20	58	M8	20	190
400	400	122	21	62	M10	20	210

5.6 The handles of shears shall be shaped to provide a smooth and comfortable grip for the hand. Handles shall be free from flash and irregular or sharp projections and edges. Shears shall be provided with handle stops so arranged as to preclude the possibility of the handles being closed beyond the effective blade-cutting point.

TABLE 2 DIMENSIONS FOR METAL CUTTING SHEARS, TYPE B

(Clause 4.1)

All dimensions in millimetres.



NOMINAL SIZE	L ±5	a ±2	b ±2	c ±5	d	e Min	f APPROX	g ±2	h ±2	l APPROX
160	160	55	10	40	M6	12	30	43	65	24
250	250	85	10	40	M6	12	30	70	95	27
300	300	105	14	50	M8	14	45	85	110	42
350	350	105	16	50	M8	14	45	90	125	42
400	400	122	20	60	M10	20	50	100	130	42

5.7 The metal cutting shears of Types A, B and C shall be of straight cut and Types D and E shall be of circular cut. The shears shall be manufactured either in right hand cut (lower blade on right hand side) or left hand cut (lower blade on left hand side).

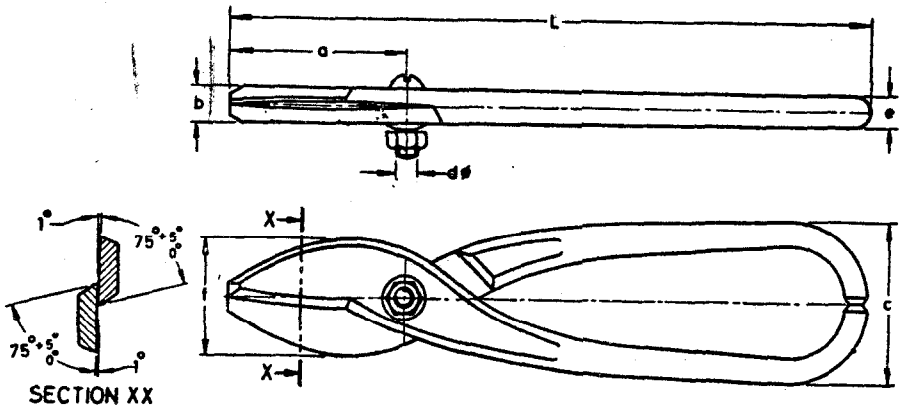
6. WORKMANSHIP AND FINISH

6.1 Shears shall be free from rust, burrs, fins, blisters and other defects that may impair serviceability and durability of the tool.

TABLE 3 DIMENSIONS FOR METAL CUTTING SHEARS, TYPE C

(Clause 4.1)

All dimensions in millimetres.



NOMINAL SIZE	L ± 5	a ± 2	b ± 5	c ± 5	d	e Min	f APPROX
160	160	45	8	50	M6	6	30
200	200	55	11	50	M6	9	36
250	250	70	12	50	M6	10	38
300	300	85	14	50	M8	12	44

6.2 Blades shall have all edges rounded except the cutting edges. The bearing side of the blades and beveled portions adjacent to the cutting edges shall be smoothly ground and shall have a natural finish. The outer side of each blade and handle shall have a painted, lacquered, enamelled or natural finish at the option of the customer. The cutting edges shall be given a suitable rust preventive treatment.

7. DESIGNATION

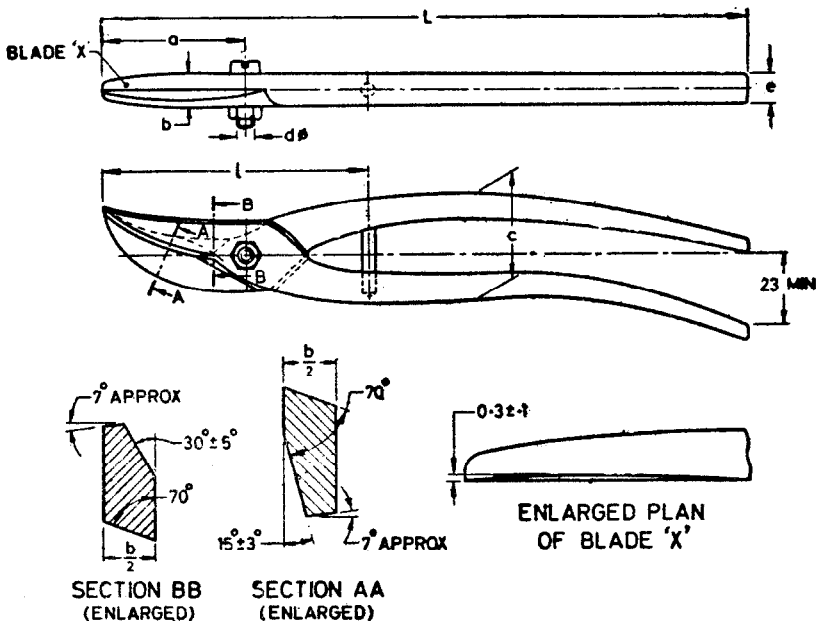
7.1 The shears shall be designated by:

- a) Commonly used name,

TABLE 4 DIMENSIONS FOR METAL CUTTING SHEARS, TYPE D

(Clause 4.1)

All dimensions in millimetres.



NOMINAL SIZE	L ± 5	a ± 2	b ± 2	c ± 5	d	e Min	l Max
250	250	55	14	40	M6	12	110
300	300	65	16	50	M8	14	125

- b) Type,
- c) Nominal size, and
- d) Number of this standard.

Example:

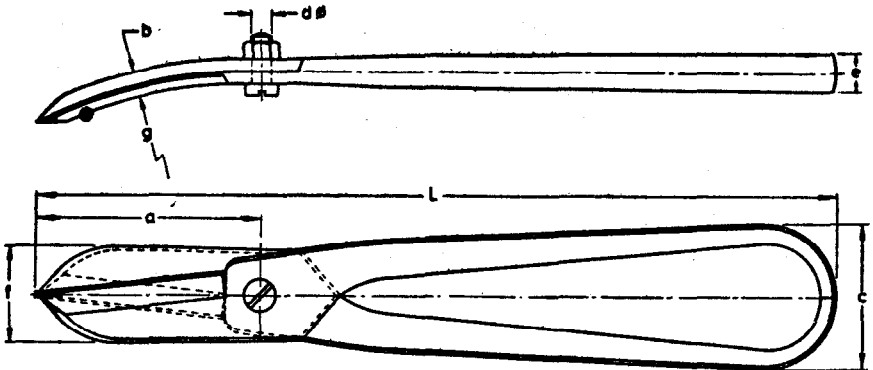
A metal cutting shear of Type A and of nominal size 200 mm shall be designated as follows:

Shears, A 200, IS : 6087.

TABLE 5 DIMENSIONS FOR METAL CUTTING SHEARS, TYPE E

(Clause 4.1)

All dimensions in millimetres.



NOMINAL SIZE	L ± 5	a ± 2	b ± 2	c ± 5	d	e Min	f APPROX	g APPROX
250	250	70	8	45	M6	12	30	140

8. MARKING

8.1 The shears shall be clearly and legibly stamped with the manufacturer's name, initials or recognized trade-mark or both. Year of manufacture shall also be marked if required by the purchaser.

8.1.1 Shears may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. SAMPLING

9.1 Unless otherwise agreed to between the purchaser and the supplier,

the sampling plan and criteria of conformity as given in Appendix A shall be followed.

10. TESTS

10.1 Paper Cutting Test — Each sample shear, both before and after being tested as specified in 10.2, shall be made to cut one sheet of bond (white or coloured) paper conforming to IS:1848-1961*. At least 300 mm of the paper shall be cut clearly without leaving torn or rugged edges using shear's full length of cut.

10.2 Metal Cutting Test — The shears shall be subjected to the following tests.

10.2.1 Load Cutting Test — Each sample shear shall make 10 cuts in steel strip as specified in Table 6. The test sheets shall be 75 mm wide by 300 mm long, having a minimum thickness as specified in Table 6. The test load shall be applied by a testing machine or other suitable device or method. The first cut shall be made parallel to the 75 mm side 10 mm from the end. Each succeeding cut shall be spaced 10 mm from the preceding cut until 10 cuts have been made. The entire length of cutting edges shall be used in making each individual cut and the test load required to make these cuts shall not exceed the values specified in Table 6.

TABLE 6 TEST REQUIREMENTS FOR METAL CUTTING SHEARS

(Clauses 10.2.1 and 10.2.3)

NOMINAL SIZE	STRIP-CUTTING CAPACITY, COLD ROLLED STEEL* THICKNESS <i>Min</i>	LOAD CUTTING TEST		WIRE NAIL CUTTING TEST, DIAMETER OF NAIL	
		†Point of Application of Load on Handle ±5	Test Load		
mm	mm	mm	N	(kgf)	mm
160	0.50	80	176.5	(18)	1.60
200	0.50	110	196.1	(20)	1.80
250	0.63	150	194.2	(30)	1.80
300	1.00	190	392.3	(40)	2.80
350	1.25	230	539.4	(55)	3.15
400	1.60	270	637.4	(85)	4.00

*Conforming to temper No. 2 half drawn of IS:4030-1967 'Specification for cold rolled carbon steel strip for general engineering purposes'.

†From the centre of bolt (*see* Tables 1 to 5).

*Specification for writing and printing papers.

10.2.2 Strip Cutting Test — Following the load cutting test, each shear shall be operated by hand to make at least five cuts across strips 10 mm wide of the same material as used in the above test; the cutting being done within 25 mm of the outer end of the blades. The shear may be rested on a bench and the strip supported or held for this test.

10.2.3 Wire Nail Cutting Test — After the strip cutting test, each sample shear operated by hand shall then be required to cut (at approximately the mid-point of the blade length) a common steel nail of diameter specified in Table 6. The test as specified in 10.1 shall again be carried out.

APPENDIX A

(Clause 9.1)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment all the metal cutting shears of the same type and size manufactured under essentially similar conditions shall be grouped to constitute a lot.

A-1.2 For ascertaining the conformity of the lot to the requirements of the specification, tests shall be carried out on each lot separately. The number of shears to be selected at random shall be in accordance with col 1 and 2 of Table 7. In order to ensure the randomness of selection IS : 4905-1968* shall be followed.

A-2. CRITERIA FOR CONFORMITY

A-2.1 The shears selected according to A-1.2 shall be examined for dimensions and workmanship and finish. Any shear failing to meet the requirements for any one of the characteristics shall be considered as defective.

A-2.1.1 If the number of defective shears found in the sample is less than or equal to the corresponding number given in col 3 of Table 7, the lot shall be declared as conforming to the requirements for dimensions, and workmanship and finish.

*Methods for random sampling.

TABLE 7 SCALE OF SAMPLING AND PERMISSIBLE NO. OF DEFECTIVES*(Clauses A-1.2, A-2.1.1, A-2.2 and A-2.2.1)*

LOT SIZE	FOR DIMENSIONS, AND WORKMANSHIP AND FINISH		FOR HARDNESS AND CUTTING TESTS	
	Sample Size	Permissible No. of Defectives	Sample Size	Permissible No. of Defectives
(1)	(2)	(3)	(4)	(5)
Up to 25	5	0	2	0
26 „ 50	8	0	3	0
51 „ 100	13	1	5	0
101 „ 150	20	2	5	0
151 „ 300	32	3	8	0
301 and above	50	5	8	0

A-2.2 From those lots found satisfactory according to **A-2.1.1** the number of shears corresponding to col 4 of Table 7 shall be selected and tested for hardness and cutting tests.

A-2.2.1 If the number of defective shears found in the sample is less than or equal to the corresponding number given in col 5 of Table 7, the lot shall be declared as conforming to the requirements of this standard.